

We claim:

1. An optical coupler including:
  - a first optical fiber; and
  - a further optical fiber rotatably mounted with respect to the first optical fiber with an
- 5 end of the first optical fiber positionable proximate an end of the further optical fiber to permit transfer of an optical signal between the first optical fiber and the further optical fiber while permitting rotation thereof.
2. The optical coupler of claim 1 wherein an optical conducting substance having an
- 10 index of refraction matching an index of refraction of the first optical fiber and the further optical fiber is located proximate the end of the first optical fiber and the end of the further optical fiber.
3. The optical coupler of claim 1 including an alignment sleeve mounted on the optical
- 15 coupler.
4. The optical coupler of claim 3 including a second optical coupler mounted in the alignment sleeve.
- 20 5. The optical coupler of claim 1 including an alignment guide thereon.
6. The optical coupler of claim 1 including a flanged member holding the first optical fiber and the rotateable member comprises a further flanged member holding the further
- 25 optical fiber.
7. The optical coupler of claim 6 wherein a U-shaped member holds the flanged member and the further flanged member in rotational engagement with each other.

8. The optical coupler of claim 1 wherein at least one of the optical fibers includes an angle cut face.

5 9. The optical coupler of claim 1 wherein the end of the first optical fiber and the end of the further optical fiber form a butt connection.

10. The optical coupler of claim 1 wherein the further optical fiber includes an angle cut face.

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11. An apparatus for optical coupling and optical decoupling comprising:  
a first optical fiber having an angle cut terminus;  
a rotational joint located on the first optical fiber  
a second optical fiber having an angle cut terminus with the angle cut terminus of the  
15 first optical fiber and the angle cut of second optical fiber positionable in optically transmittable condition with each other to minimize back reflections; and

an alignment sleeve for holding the angle cut terminus of the first optical fiber and the angle cut terminus of the second optical fiber in rotational alignment with respect to each other.

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12. The apparatus of claim 11 with the rotational joint having a member with an alignment guide thereon.

13. The apparatus of claim 11 wherein the first optical fiber includes a butt connectable  
25 end in the rotational joint on the first optical fiber.

14. The apparatus of claim 13 includes an optically conducting substance having an index of refraction matching an index of refraction of the first optical fiber proximate the butt connectable end in the rotational joint.

5 15. An apparatus for optical coupling and decoupling comprising:

a first optical lead having a butt connectable end;

a first member holding the first optical lead;

a second optical lead having a butt connectable end;

a second member holding the butt connectable end of the second optical lead in

10 rotational relationship with respect to the butt connectable end of the first optical lead;

the second optical lead having an angle cut end face to allow passage of an optical signal through the angle cut end face; and

a transparent substance extending between the butt connectable end of the first optical lead and the butt connectable end of the second optical lead with the transparent

15 substance having an index of refraction substantially equal to an index of refraction of the first optical lead and the second optical lead to thereby inhibit loss of an optical signal therebetween while permitting rotation thereof.

16. A method of twist free optical coupling comprising:

20 forming a rotational butt coupled joint in an optical lead having a terminus;

forming a coupling angle cut face on the terminus of the optical lead;

forming a mating coupling angle cut face on the terminus of another optical lead;

and

rotationally aligning the coupling angle cut face on the terminus of the optical lead

25 with the mating coupling angle cut face to thereby transmit an optical signal therebetween while minimizing back reflection and twisting of the optical lead.

17. The method of claim 16 including the step of placing an optically conducting substance having an index of refraction matching an index of refraction of the optical leads in the butt coupled joint.

5 18. The method of claim 16 including the step of using an alignment sleeve to rotationally align the coupling angle cut face and the mating coupling angle cut face.

19. The method of claim 18 including the step of using an alignment guide in cooperation with the alignment sleeve to align the coupling angle cut face and the mating  
10 coupling angle cut face.

20. The method of claim 19 including the step of placing a rotational joint in the other optical.